

MYSTERY

IN

ALASKA

BY MARK FARMER

At a remote facility ringed with barbed wire, a brand-new array of 36 antennas rises from the black spruce forest that stretches hundreds of miles across central Alaska. Completed last December and now undergoing testing, the antenna field is the visible part of a powerful and sophisticated high-frequency radio transmitter designed to transform areas of the upper atmosphere into the equivalent of huge lenses, mirrors, and antennas.

This little-known Pentagon-sponsored radio-physics project, called the High-Frequency Active Auroral Research Program (HAARP), is officially intended to expand knowledge about the nature of long-range radio communications and surveillance using the fluctuating ionosphere [see "Way Up in the Ionosphere"], the portion of the upper atmosphere extending from 35 to 500 miles above Earth's surface.

According to program manager John L. Heckscher of the Phillips Laboratory at Hanscom AFB, Massachusetts, potential military applications of the HAARP research include developing Department of Defense technology for detecting cruise missiles and communicating with submarines. "Although HAARP is being managed by the Air Force and Navy, it is purely a scientific research facility that poses no threat to potential adversaries and has no value as a military target," he says.

But that's just the publicly announced part

of the program. HAARP also has a secret agenda: pursuing more exotic military goals, such as locating deeply buried weapons factories thousands of miles away—and even altering the local weather above an enemy's territory.

A 1990 internal document obtained by POPULAR SCIENCE says the program's overall goal is to "control ionospheric processes in such a way as to greatly improve the performance of military command, control, and communications systems." It provides a description of the following applications:

- Injecting high-frequency radio energy into the ionosphere to create huge, extremely low frequency (ELF) virtual antennas used for earth-penetrating tomography—peering deep beneath the surface of the ground by collecting and analyzing reflected ELF waves beamed down from above.

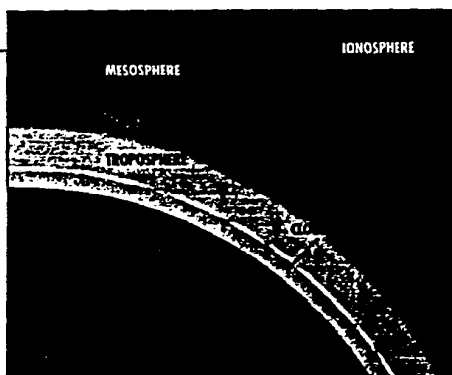
- Heating regions of the lower and upper ionosphere to form virtual "lenses" and "mirrors" that can reflect a broad range of radio frequencies far over the horizon to detect stealthy cruise missiles and aircraft.

- Generating ELF radio waves in the ionosphere to communicate across large distances with deeply submerged submarines.

And, patent documents filed during an earlier research effort that evolved into the HAARP program outline further military applications of ionospheric-heating technology:

- Creating a "full global shield" that would destroy ballistic missiles by overheating their electronic guidance systems as they fly

into the upper atmosphere. Exploring goals.



WAY UP IN THE IONOSPHERE

The atmosphere near Earth's surface is composed of a soup of neutral atoms and molecules of various gases, mostly nitrogen and oxygen. Things are different in the rarefied ionosphere, where the Sun's ultraviolet and X-ray radiation transforms these particles into ions and free electrons through the process known as ionization.

Radio communications are profoundly affected by the ionosphere, which can variously reflect, distort, or absorb radio signals, depending on their frequency and other conditions. Sometimes listeners around the world can hear a high-frequency, shortwave broadcast that has repeatedly "bounced" off the ionosphere. Similarly, AM radio broadcasts that don't carry very far during the day can sometimes be received much farther away at night, when the ionosphere's reflectivity increases.

The ionosphere is a notoriously changeable medium for radio transmission. It varies with the day-night cycle, in response to perturbations in Earth's magnetic field, and particularly during periods of sunspot activity, when high-frequency and very low frequency radio communication may become impossible, and power-grid failures on the ground can even occur.

Since there are so few atmospheric particles in the ionosphere, our normal concept of temperature doesn't work. Up there, temperature is an expression of how excited or "hot" the electrons are. Electron temperatures range between -130°F and 302°F across the ionosphere's four layers, which extend from 35 to 500 miles in altitude.

The local heating effect of the HAARP transmitter is expected to raise electron temperature by 40°F, according to the Air Force, and to endure as long as three months.—M. F.

through a powerful radio-energy field.

- Distinguishing nuclear warheads from decoys by sensing their elemental composition.
- Manipulating local weather.

When the full HAARP facility is constructed, it will include several sensing and analysis systems. At its heart is the antenna field, which now is a demonstration version of a larger

planned array named the ionospheric research instrument (IRI), which will include 360 antennas. The IRI is designed to temporarily modify 30-mile diameter patches of the upper atmosphere by exciting, or "heating," their constituent electrons and ions with focused beams of powerful, high-frequency radio energy. A household analogy would be a microwave oven, which heats dinner by exciting the food's water molecules with microwave energy.

Earth-penetrating tomography is a startling potential use of ionospheric heating. The method would work by beaming radio energy into the Auroral electrojet, the curved, charged-particle stream formed at high latitudes where the solar wind interacts with Earth's magnetic field. The radio energy then disperses over large areas through ductlike regions of the ionosphere, forming a virtual antenna that can be thousands of miles in length.

Such an ELF antenna can emit waves penetrating as deeply as several

kilometers into the ground, depending on the geological makeup and subsurface water conditions in a targeted area. Aircraft or satellites stationed overhead would then collect the reflected ELF waves and relay them to computers at a processing station, where subsurface inhomogeneities that trace the outlines of structures such as underground weapons facilities can be imaged. North Korea and Iraq, where buried nuclear weapons labs are believed to exist, would be prime candidates for earth-penetrating tomography surveillance.

Virtual lenses and mirrors will be generated in the ionosphere, if the IRI works as intended. By precisely warming a patch of the lower ionosphere, the IRI reduces its density relative to the surrounding atmosphere. An "ionospheric lens" thus formed can in turn focus a radio beam into the upper ionosphere [see drawing]. Normally, most high-frequency radio waves broadcast from the ground are absorbed or scattered in the lower ionosphere, and few of them reach such high altitudes.

Next, the focused radio beam excites a patch of the upper ionosphere to form a virtual mirror. Finally, a radio-communication signal broadcast by the IRI, focused through the lens and reflected from the mirror, can be directed far over the horizon.

Virtual lenses and mirrors could also be used to scan a blanket of very low frequency (VLF) radio waves transmitted by an over-the-horizon radar. Although they reflect little VLF energy, stealth



Heated ionospheric "lens" and "mirror" created by HAARP antenna focus and reflect a radio-energy beam to detect a stealthy cruise missile from above. An AWACS plane collects the signals.

aircraft can appear from above as holes in the blanket," thus betraying their position.

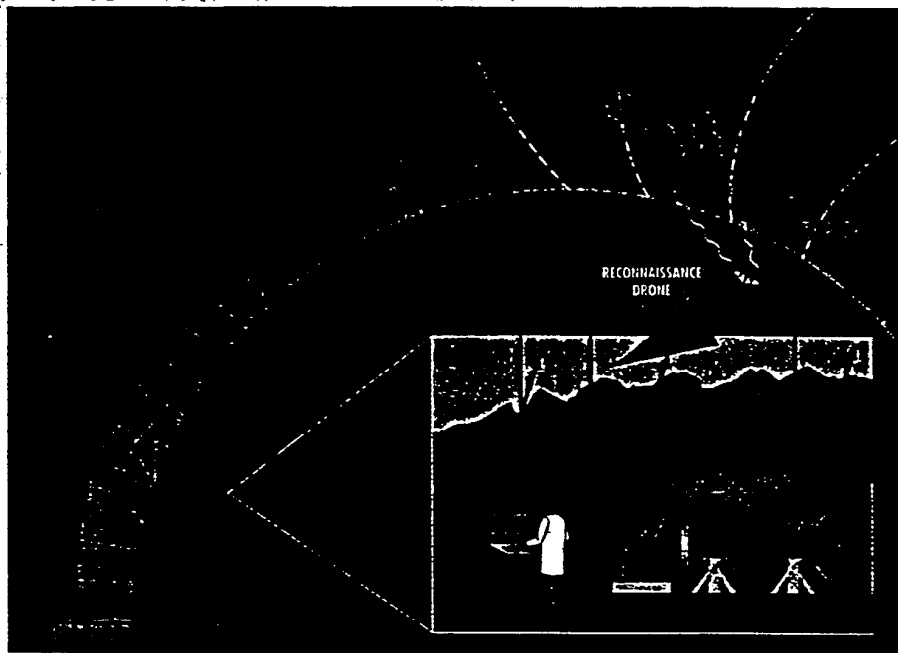
Proprietary phased-array transmitting, steering, and pulsing techniques built into the IRI will permit rapid aiming of the radio-frequency beam in any direction, and at angles as low as 30 degrees above the horizon. This "oblique heating" ability enables HAARP to form virtual lenses or mirrors at distances of more than 1,000 miles from the transmitter.

Deeply submerged submarines can receive secure messages through ELF radio communication. But the antenna needed to generate a desirable transmission frequency such as 30Hz must be more than 1,200 miles long. Real estate parcels this shape are hard to come by on the ground, but not in the air. As in the case of earth-penetrating tomography, high-frequency radio energy transmitted into the Auroral electrojet can form a submarine communications ELF antenna thousands of miles long. Consequently, HAARP can beam ELF waves at nearly any portion of the Northern Hemisphere by using oblique heating.

The full global shield is an exotic proposal for an Earth-encompassing shell of high-speed electrons and ions that would be generated by a much more powerful version of HAARP. Any missile or warhead passing through the protective shell would explode. Or, a "soft-kill" weapon system using ELF waves produced by HAARP heating could be used to overload power-distribution grids and destroy unshielded microelectronics using electromagnetic pulse energy similar to that released by a high-altitude nuclear explosion.

Real nuclear warheads and decoys, or the constituent materials of unfamiliar satellites, could be remotely distinguished in flight by bathing them in accelerated electrons. Analyzing the electromagnetic signal returns would reveal their elemental composition.

Weather manipulation may be possible by building an ionospheric heater a thousandfold more powerful than HAARP. Differential heating of areas of the atmosphere could induce local weather conditions, such as floods or droughts, useful to the military. Smooth seas might suddenly be raked by treacherous squalls, creating or denying a tactical advantage.



Underground bomb lab is detected by using an extremely low frequency (ELF) ionospheric "antenna" formed by beaming radio energy into the Auroral electrojet from the HAARP site in Alaska.

Other elements that will be installed at the HAARP facility include a 120-foot diameter incoherent-scatter radar dish, a Laser Detection and Ranging Device (LIDAR), a magnetometer, and other optical and infrared instruments designed to analyze low-level light emissions induced in IRI-heated regions of the ionosphere. In all, HAARP's assemblage of transmitters, receivers, computers, and advanced signal-processing methods places it on the cutting edge of high-energy radio-physics research.

The program is managed by the US-AF Phillips Laboratory and the Office of Naval Research. Equipment is supplied by Advanced Power Technologies, a Washington, D.C.-based subsidiary of E-Systems of Dallas, a longtime maker of electronics used in ultrasecret projects such as signals-intelligence satellites and the President's E-4B "doomsday plane," which is designed to serve as an airborne White House in the event of nuclear war.

Initial work on HAARP was begun in the mid-1980s by Atlantic Richfield Corp.'s subsidiary, ARCO Production Technologies Corp., and its then-president, physicist Bernard Eastlund. ARCO wanted to find an on-site demand for the enormous amounts of Alaskan natural gas it owns. So it cooked up an energy-intensive idea.

Eastlund worked under contract for the Defense Advanced Research Projects Agency (now called ARPA) and was awarded three patents—one of which was classified until 1991—for inventions dealing with ionospheric mod-

ification. One of the most grandiose systems described in his patents is a 40-mile square, HAARP-like radio transmitter that would have used huge amounts of electric power generated by turbines burning natural gas drawn from the vast North Slope reserves. "Full global shield" was conceived to wipe out the guidance systems of missiles in flight anywhere in the world.

"I founded and led the ARCO program until 1987," Eastlund says. "About that time Edward Teller visited Robert Hirsch, the ARCO vice president who had hired me. I don't know the direct results of that discussion, but shortly thereafter new [secret] initiatives began which I was not privy to, and I declined further involvement."

Teller is a co-designer of the hydrogen bomb and was the arch-proponent of the now-abandoned X-ray laser—the centerpiece of Ronald Reagan's Star Wars missile-defense program. Asked about his involvement in the beginnings of HAARP, Teller responded "I have no idea about that. I don't remember anything about it."

Although it is much smaller than a "full global shield" system, Eastlund says, "HAARP is the perfect first step toward a plan like mine. Advances in phased-array transmitter technology and power generation can produce the field strength required. The government will say it isn't so, but if it quacks like a duck, and it looks like a duck—there's a good chance it is a duck."

Advanced Power Technologies presi-

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Mystery in Alaska

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dent Ramy Shanny declined to comment on Eastlund's claims. And the Defense Department is making no effort to dispel the impression that Eastlund's story might sound a bit like science fiction. "HAARP certainly does not have anything to do with Eastlund's thing, that is just crazy," says Heckscher. "What we have here is a premier scientific research facility with military applications."

Richard Williams, a physical chemist and consultant to the Sarnoff Laboratory at Princeton University, sees things differently. "Eastlund is an intellectual ace and a technologically savvy guy," he says, "though there is a bit of Dr. Strangelove in him."

Speculation and controversy surround the question of whether HAARP's 1.7 gigawatts (1.7 billion watts) of effective radiated power in the 2.8- to 10MHz frequency range might cause lasting damage to Earth's upper atmosphere. By comparison, the energy level is more than 3,000 times greater than the biggest commercial AM radio transmitters.

"HAARP will dump enormous amounts of energy into the upper atmosphere. We don't know what will happen," says Williams. "My concern is its effect on a global scale—you can't localize the effects. With experiments on this scale, irreparable damage could be done in a short time. The immediate need is for open discussion. To do otherwise would be an act of global vandalism."

Eastlund himself observes that "There has never been a transmitter of this power in this frequency band. It would be wise to assess its impact."

The 440-page HAARP environmental-impact statement filed by the Air Force says that the normally upward-directed IRI transmissions can raise the internal body temperature of nearby people; ignite road flares in the trunks of cars; detonate aerial munitions that use electronic fuses; and scramble aircraft communications, navigation, and flight-control systems.

Program officials insist that the facility will operate safely during the four or five 14-day transmitting "campaigns" scheduled yearly. An integral part of the HAARP design is a system programmed to automatically cease transmitter operation if nearby aircraft are detected. The chain-link fence is designed to keep visitors from ending up in the path of a low-angle beam.

For decades, high-frequency heaters around the globe have been operated by researchers studying how the injection of radio energy affects the ionosphere, and the process by which the upper atmosphere recovers from the disturbance. These include transmitters in Tromsø, Norway, which are operated by Germany's Max Planck Institute; Nizhny-Novgorod, Russia, and Dushanbe, Tadzhikistan, which are manned by Russian scientists; and U.S. facilities at Arecibo, Puerto Rico, and Fairbanks, Alaska.

HAARP's power output—nearly twice that of any other ionospheric

heater—combined with the rapid beam-steering ability and broad frequency range of its transmitter, will permit the IRI to modify higher-altitude areas of the ionosphere from greater distances than ever. A bank of six 2.5-megawatt, 3,600-horsepower diesel generators powers the IRI prototype, while the rest of the facility taps electricity from a nearby power line.

Some prominent experts are unmoved by talk of HAARP's possibly dire effects. The dean of American space sci-

Angels Don't Play This HAARP

Advances In Tesla Technology
THE VIDEO



Presented by Dr. Nick Begich

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entists, James Van Allen, professor of physics at the University of Iowa and discoverer of the Earth-girdling radiation belts that bear his name, says "Every time you turn on a radio transmitter you modify the ionosphere. HAARP will perturb the ionosphere markedly for an hour, or maybe even a day, or perhaps at most a month. I don't see any deleterious effects other than on local communications."

Van Allen says five decades of research have given him a feeling for the

minute scale of influence humans have on the cosmos. "There is nothing that we as men can do that does not pale in comparison to the forces of nature."

Alfred Y. Wong, professor of physics at UCLA and director of the high-power active-stimulation ionospheric heater—HAARP's little brother—located in Fairbanks, Alaska, simulates ionospheric conditions in an atmospheric chamber at his Los Angeles laboratory. The device subjects electrons and ions to high-frequency radio heat-

ing, replicating the effects of HAARP. "We understand most of the fundamental mechanisms that underlie ionospheric heating. In chamber simulations we've conducted very detailed studies with reproducible results. We put probes in the chamber to study this. We found no negative effects," he says.

Wong believes HAARP could be used for environmental mitigation efforts, such as accelerating chlorine atoms into interplanetary space to prevent them from degrading Earth's vital upper-atmospheric ozone layer. Though he acknowledges potential offensive military uses of HAARP, Wong believes no harm will occur from its operation. "I don't see any problems, only surprises," he says. "That's why we do research."

Others harbor a strong distrust of the program. A local organization called No HAARP firmly opposes the project on environmental and communications-disruption grounds. "This is not good science," contends retired ARCO Production Technologies employee Clare Zickuhr, who leads the group. "They have no idea what this thing could do to the ionosphere. To put this in the hands of the military scares the hell out of me."

HAARP has proceeded full-steam ahead since its inception in 1990. The total amount of money spent over the past six years exceeds \$58 million and may reach nearly \$200 million by the end of the decade, when the installation is scheduled to be completed. The effort is a "congressional special-interest program," meaning that supporters in Congress request funds for it on behalf of the Air Force and Navy.

Sen. Ted Stevens (R-Alaska) is a staunch supporter of the program. Other Alaska state officials, however, have not been briefed about HAARP by the military. Asked about the program, a spokesman for Gov. Tony Knowles replied, "We have no idea what you are talking about." State Rep. Jeanette James, whose district surrounds the HAARP site, has repeatedly asked Air Force officials about the project and has been told "not to worry," she says. "My gut feeling is that it's frightening. I'm skeptical. I don't think they know what they are doing."

This is not the last we will hear of HAARP. Whether or not the program sponsors understand its long-term effects, they appear to feel that the potential for useful military payoffs makes it worth taking some political heat—although they may not have expected to attract any attention way back in Alaska's sub-Arctic tundra.

Environmental Warfare?

The U.S. Government has a new ground-based "Star Wars" weapon which is being tested in the remote bush country of Alaska. This new system manipulates the environment in a way which can:

- Disrupt human mental processes.
- Jam all global communications systems.
- Change weather patterns over large areas.
- Interfere with wildlife migration patterns.
- Negatively affect your health.
- Unnaturally impact the Earth's upper atmosphere.

The U.S. military calls its zapper HAARP (High-frequency Active Auroral Research Program). But this skybuster is not about the Northern Lights. The device will turn on lights never intended to be artificially manipulated.

Their first target is the electrojet - a river of electricity that flows thousands of miles through the sky and down into the polar icecap. The electrojet will become a vibrating artificial antenna for sensing electromagnetic radiation raining down on the Earth. The U.S. military can then "X-ray" the Earth and talk to submarines. But there's much more they can do with HAARP. This video reveals surprises from secret meetings.

PROJECT CENSORED - A prestigious panel of journalists - judged HAARP to be in the top ten under-reported news stories of 1994.

POPULAR SCIENCE magazine - As a front-cover story, HAARP began to be revealed in September, 1995. This video is the rest of the story.

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